



Fact Sheet

Wells at Allen Natural Gas Plant

TVA's Allen reservation is located on more than 500 acres in Shelby County, Tennessee. The site houses an active coal plant and a natural gas plant under construction. TVA purchased the fossil plant from Memphis Light Gas and Water in 1984. The site is named for Thomas Allen, a former president of MLGW.

Background

In August 2014, the TVA board approved construction of a 1,076 megawatt gas-fired plant at Allen to replace the existing Allen Fossil Plant. Construction on the Allen Gas Plant is roughly 75 percent complete. The gas plant should begin operations sometime in mid-2018, and will replace the Allen Fossil Plant, which must be retired by Dec. 31, 2018. The gas plant will supply electricity to more than 500,000 average homes.

Note

TVA does not plan to utilize the Allen gas plant cooling water wells for plant operations until the remedial investigation into arsenic contamination, found in shallow monitoring wells a half-mile away at the fossil plant, provides additional data to support safe use.

Key Points

- TVA is retiring the three coal-fired generation units at the Allen Fossil Plant in Memphis and replacing it with a natural gas plant. The gas plant will reduce emissions and ensure greater flexibility for TVA's electric system.
- The actions at Allen support cleaner air and continued reliability of our power system, for which Memphis is our largest customer. The improved air quality in the Memphis area is important to the region's vitality and future economic development.
- It is vital that the plant have a direct, uninterrupted and redundant water supply in order to operate.
- TVA will purchase water for steam generation from MLGW. TVA will also use MLGW-purchased water for all fire protection water.
- However, TVA needs additional water to cool the generating equipment, especially during peak periods. The installation of groundwater wells places the least constraints on plant operation during peak periods. Groundwater wells also are the least expensive option and will provide the greatest relative benefit to consumers of TVA power.
- TVA has installed five wells into the deep aquifer to provide sufficient cooling water during peak demand. Two wells are needed for normal operations; four wells are needed for peak operations and the fifth well will be used for backup.
- The amount of water needed by the plant each day is equal to less than a minute in the shower for each power consumer served by the gas plant.



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- TVA has extensive experience using deep production wells safely. We have them currently at Southaven, Lagoon Creek, Magnolia and Ackerman combined cycle plants.

More information on the environmental assessment of the options can be found at <https://www.tva.gov/Environment/Environmental-Stewardship/Environmental-Reviews/Allen-Fossil-Plant-Emission-Control-Project>

Impacts on the Memphis Sand Aquifer

- Water levels in the Memphis Sand Aquifer have remained stable for many years.
- Currently all withdrawals from the aquifer total about 196 million gallons per day. TVA would require on average an additional 3.5 million gallons per day.
- TVA's aquifer withdrawals would be about 2 percent of the total daily withdrawals from the aquifer in Shelby County. This withdrawal would happen whether the water is purchased from MLGW or withdrawn from TVA wells. The difference is that the latter is to the benefit of TVA consumers.
- The City of Memphis has one of the largest groundwater withdrawals of any municipality in the southeastern United States at an average 135 million gallons per day. Other communities in Shelby County withdraw an additional total of 18.5 million gallons per day.
- Many industrial users in the Memphis area also have wells in the Memphis Sand Aquifer, including some that are within a two-mile radius of the gas plant.

Other information

- The \$975 million construction project is a substantial investment in the Memphis community, and is estimated to bring \$233 million in spending to the local area. This includes direct material and equipment purchases and spending on contractors and workers related to the work.
- The addition of the Allen Gas Plant supports TVA's vision to be a national leader in providing low-cost, cleaner energy.
- Compared to the current coal plant, the natural gas plant will reduce carbon dioxide emissions by more than 60 percent, nitrogen oxides by 90 percent and sulfur dioxide by nearly 100 percent.
- All of TVA's combined-cycle gas generation has been added since 2007, reflecting TVA's commitment to cleaner, more efficient forms of energy that can diversify TVA's generation mix.



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Questions & Answers

Why not purchase water from MLGW for the cooling system?

- Purchasing the additional water necessary to meet demands for cooling the equipment would require the construction of massive storage tanks and additional operating costs of more than \$1 million a year at the expense of TVA consumers across the Valley.

Why not purchase “gray water” from the city?

- TVA evaluated several gray water treatment technologies required to remove constituents in the water that would significantly reduce the effectiveness of the cooling water system equipment.
- An economic analysis was performed on each technology and results indicated that the cost associated with gray water treatment is significantly more expensive than using other water sources—up to an additional \$6.3 million annually, not including up front costs. These costs would again be passed on to consumers of TVA power.

Why not river or lake water?

- Allen gas plant is land locked and doesn't have easements for pipelines to the river or lake, each nearly a mile away.
- TVA would also need to build and operate extensive water treatment equipment at the site.
- The significant costs involved would be passed on to consumers of TVA power.

How is electricity made with a combined-cycle plant?

The two combustion turbines at Allen operate like jet engines, drawing in air, compressing it, mixing it with fuel and igniting it. Each turbine is connected to a generator to produce electricity. The hot combustion gases from the three turbines are captured, combined and used to make steam to drive a single steam turbine. The steam turbine produces an additional 50 percent output over the combustion turbines alone. This is known as a two-on-one configuration.

Does the plant have emissions controls?

Yes. The plant has a catalytic converter, similar to equipment on every modern automobile, to remove carbon monoxide, and a Selective Catalytic Reduction system to remove nitrogen oxides. The amount of sulfur in natural gas is negligible, eliminating the need for a desulfurization system or scrubber.

How many combined-cycle plants does TVA operate?

TVA operates six combined-cycle gas plants - Paradise in Kentucky; Magnolia, Caledonia and Southaven in Mississippi; and John Sevier and Lagoon Creek in Tennessee.



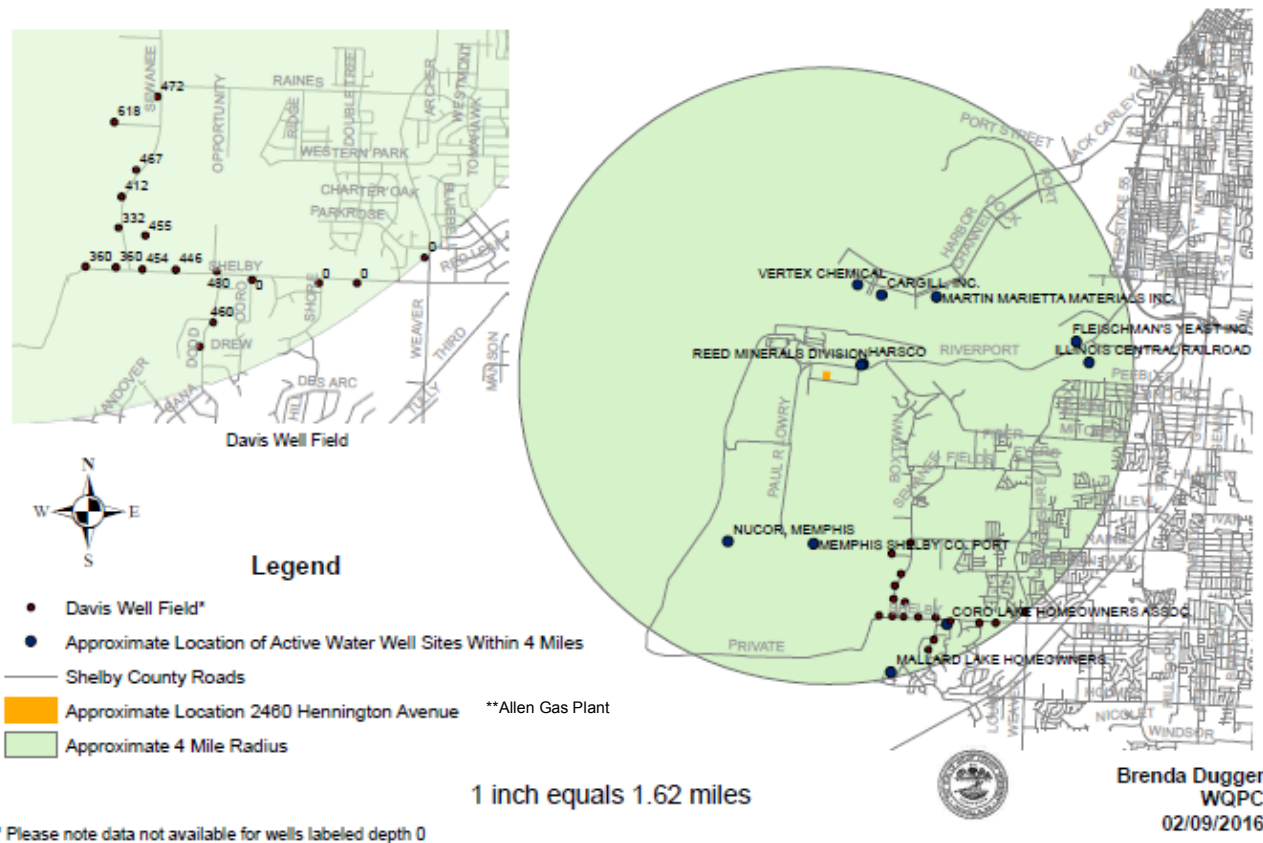
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Map

This map, with the Allen Gas Plant highlighted in yellow, shows the locations of other deep aquifer wells within a 4-mile radius of the TVA facility under construction. These wells remove water from the same aquifer TVA is permitted to draw from.

Water Well Locations 4 Mile Radius of 2460 Hennington Memphis-Shelby County, Tennessee



* Please note data not available for wells labeled depth 0